Space Weather Forecast

Issued on Sunday, 25 December 2022 at 13:24 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Potential Earth-directed CMEs on 26 and 27 December with possible G1/Minor Storms and low risk of G2.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Low, with limited Common-class flares observed through the last 24 hours. The largest regions, AR3169 and AR3171 remaining large and relatively complex. The remaining regions have shown only modest developments and all remain relatively simple.

Multiple CMEs (coronal mass ejections) have been analysed over the last 24hrs, generally slow and with no significant Earth directed component however we await model data for a faster CME associated with a larger common-class flare from AR3169 approximately 25/0700 UTC.

Solar Wind / Geomagnetic Activity: Solar winds have followed a declining trend through the last 24 hours from elevated to slightly elevated levels. Magnetic field strength was at moderate to weak levels, with the north-south component only varying weakly. Geomagnetic activity was Quiet to Active through the period.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be mainly at Low levels, with a chance of M-class flaring.

Solar Wind / Geomagnetic Activity: A CME which left the Sun on 21 December is likely to have passed the Earth with no effects and has been removed from the forecast. Two further CMEs are forecast to potentially have Earth-impacting components. The first, which left the northeast quadrant of the approximately Sun 24/0230UTC may glance the Earth on 26 December, and another CME which left the Sun approximately 24/0800UTC may arrive at earth on 27 December
A fast solar wind is expected to continue to wane through 25 December, though further enhancements possible into 26 or during 27 December, but with low confidence.
Geomagnetic activity is forecast to be mainly Quiet to Unsettled on 25 December. There is then a risk of Active or G1/Minor Storm intervals on 26 and 27 December due to possible CME arrivals and a chance of these combining with residual high speed wind connections. Any CME arrival on 27 December could see residual storming into 28 December.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, although the daily risk has been revised upwards slightly to account for recent growth and westward rotation in the largest sunspot group.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	40	50	20
Strong	G3	No	1	5	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	25	25	25	25
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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